



Barr River hydro scheme

Monthly report – December 2023

1 Summary

A very strong month, well ahead of the long term average.

2 Monthly generation & revenue

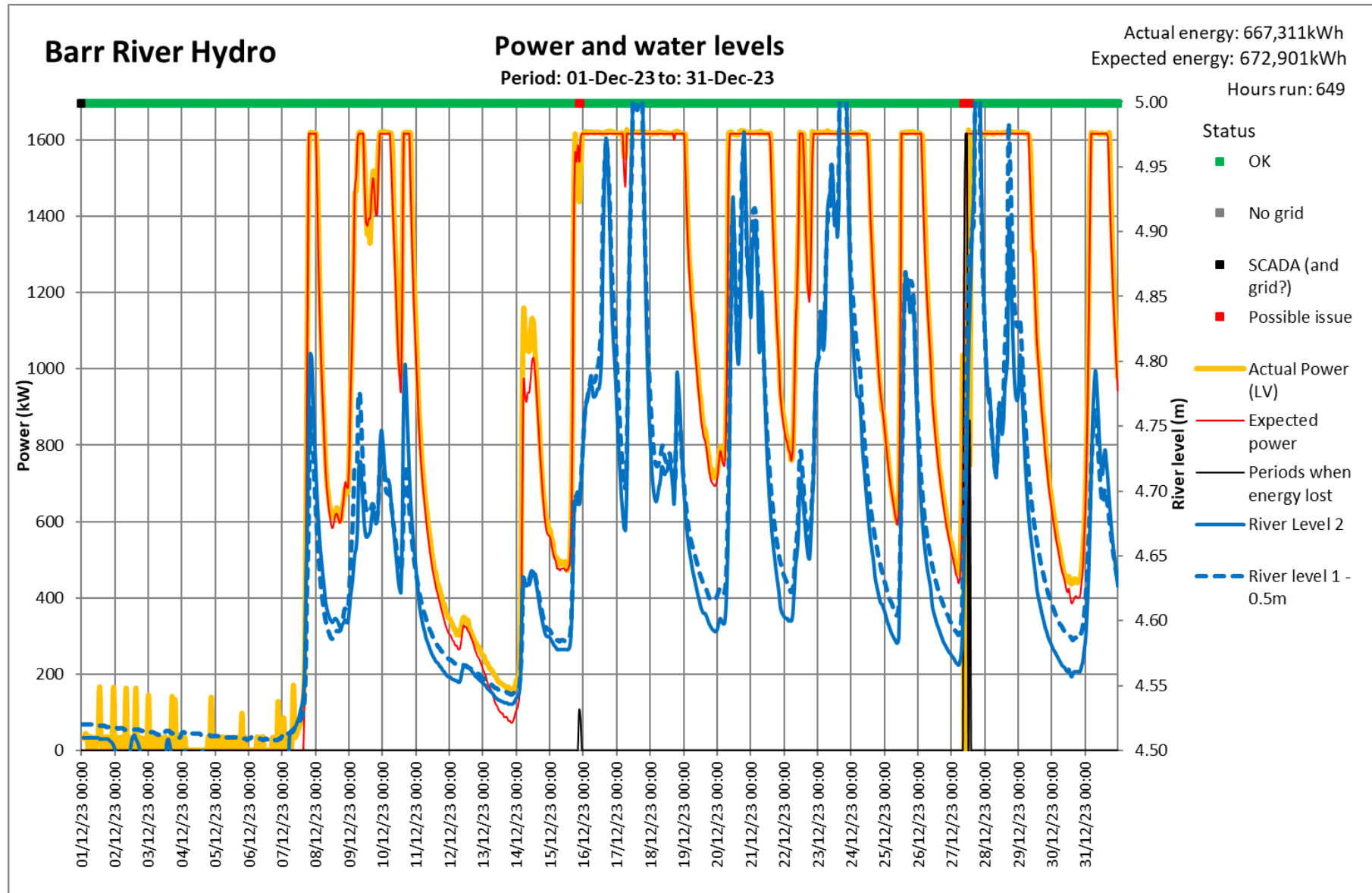
Parameter	Value
Actual generation (FIT meter), kWh	667,311
Average generation in month, kWh	368,179
Forecast generation in month (P50), kWh	620,057
Actual relative to forecast	107.6%
Rainfall relative to 1991-2020 average by month	137%
Calculated generation ¹ kWh	672,901
Actual relative to calculated generation, kWh	-5,590
Actual relative to calculated generation, %	-0.8%
Approximate revenue in month ²	£227,701

¹ Calculated generation is based on river level data and seeks to establish the expected generation with no performance issues.

² Export revenue based on reported export and estimated GDUoS charges.

Export meter	Value
Export, kWh	657,521
Variance to generation, kWh	-9,790
Variance to generation, %	-1.5%

3 System reporting



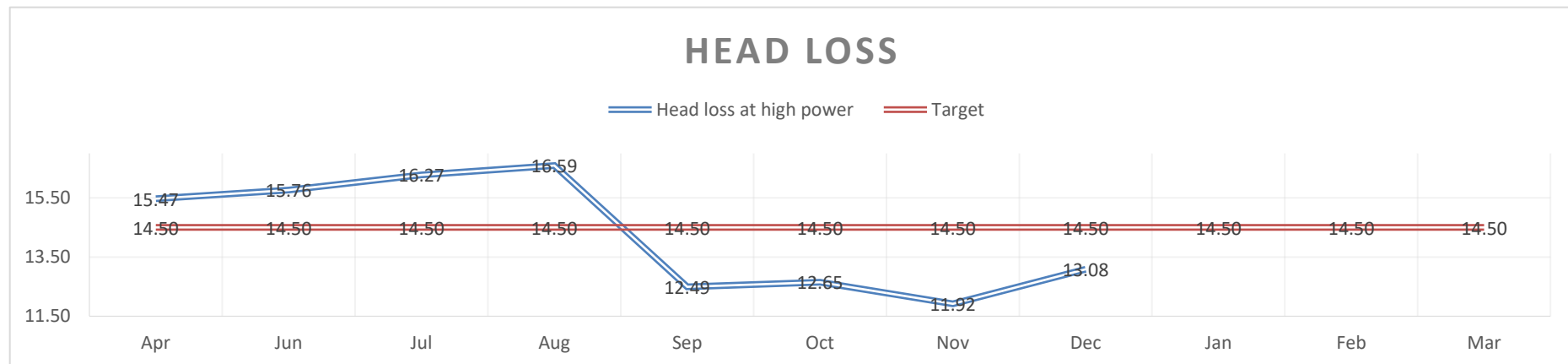
3.1 Scheme anomalies to calculated generation

Date/time	Details	Action required
	Scheme generating above calculation especially at low levels	None

3.2 Other system events

Date/time	Details	Action required
22/12/2023	Network Protection trip	Checked and the machine has restarted OK. At full power. This was due to grid instability.
23/12/2023	High Reactive Energy alarm	Checked and running OK. Again, likely due to grid instability.
27/12/2023	QF1 Trip of the generator breaker	This required Douglas to visit site to reset. This trip was accompanied by an F058 fault code. This is a new code to us. Cink have been asked to explain. GHC to chase.

3.3 Head loss



3.4 Temperatures

Parameter	Temperature at or near full power, °C	Alert level, °C	Parameter	Temperature at or near full power, °C	Alert level, °C
Generator DE bearing	37	85	Generator winding 1	65	145
Generator NDE bearing 1	43	85	Generator winding 2	62	145
Generator NDE bearing 2	46	85	Generator winding 3	66	145
Turbine room	21	30	Power cabinet (RG1)	29	42

3.5 Vibration

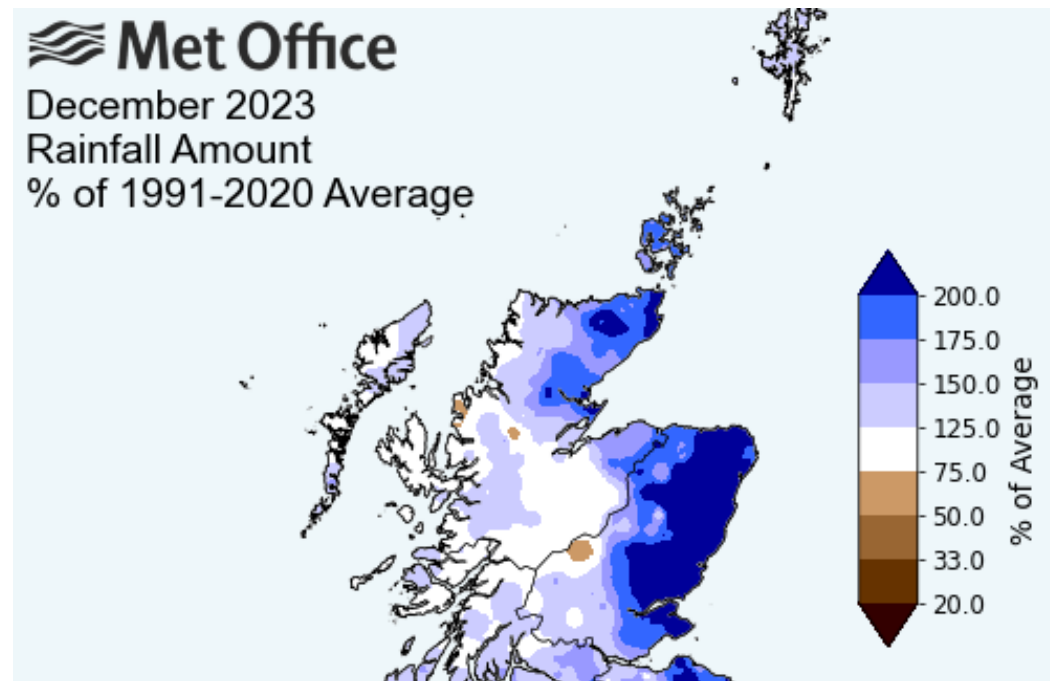
Parameter	Vibration at or near full power, mm/s	Alert level, mm/s	Parameter	Vibration at or near full power, mm/s	Alert level, mm/s
Generator DE	0.42	3.0	Generator NDE	1.22	3.0

3.6 Recommended and ongoing actions

Action	Responsibility	Status
Install power quality monitoring equipment at grid connection to address grid trips affecting the generator breaker and requiring a site visit.	GHC	The data logger from the power monitor was removed and sent back to Charlie following the trip on the 27 th December. The data is now being discussed with Charlie and with SSE.
Chase SSE for details of planned outage in 2024	GHC	RH has had one high level meeting with SSE regarding this and various follow-up correspondence. SSE have now advised that, following further reviews, we will be able to continue generating throughout these works.
Spares stock to be reviewed	Morvolts/GHC	Missing spares to be ordered by MorVolts, with GHC assistance. Morvolts to confirm spares all in stock.

Confirm ACB spares requirement	GHC	RB Switchgear to inspect breaker when 'it is next switched off' - i.e. during next service/site attendance - but note that this will require isolation by the AP.
Maintenance schedule and training to be reviewed	GHC	GHC have propose a simplified maintenance schedule. This will be discussed with Morvolts on a call with Douglas. Morvolts to propose a time and date for this call.
Arrangements to be established with Colin Thwaites for HV switching/isolation	Morvolts	MorVolts have confirmed that Colin has been appointed as AP. Padlocks to be changed to Colin's locks.
Intake 1 – copper earthing rod protruding from the intake wall to be cut/ground off, leaving 15mm only protruding	Morvolts	Noted at annual visit
Intake 2 - plunge pool stop log to be replaced	Morvolts	Washed away and destroyed
MN6, MN7 and Intake 3 head ponds to be dug out	Morvolts	Should be monitored for some time to ensure flow is not impeded
First aid kits to be wall mounted	Morvolts	
Replace restrictor valve on MIV ram	GHC	Leaking slowly – with Cink for next visit.
Complete procurement of outstanding spare parts	Morvolts/GHC	Parts are identified on Spares schedule. Some have recently been identified as being required, some are yet to be identified/located. Morvolts to advise of any outstanding parts.
Inspection/service of comms due June 23	GHC	Hydrocomm's response to our chasing is that they are waiting feedback from Morvolts to a proposal to upgrade the comms. Morvolts to advise.

4 Rainfall



Rainfall this month (rain gauge), mm	310
Western Scotland rainfall in month with respect to 1991-2020 long term average	131%

5 Scheme annual performance summary

FY 2023/4	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
Actual generation kWh	240,542	57,453	111,100	374,109	360,348	431,554	434,771	406,551	667,311				3,083,739
Average generation since commissioning	247,605	424,386	286,501	165,261	174,610	297,736	672,489	693,043	368,179	594,556	547,677	298,520	3,329,808
Forecast generation (P50)	369,360	226,766	188,561	195,146	280,601	387,431	582,631	618,214	620,057	695,941	554,678	611,047	3,468,767
Actual relative to forecast	65.1%	25.3%	58.9%	191.7%	128.4%	111.4%	74.6%	65.8%	107.6%				88.9%
Rainfall relative to 1991-2020 average	83%	45%	81%	152%	73%	145%	83%	74%	137%				97%
Calculated generation kWh	243,307	59,162	112,194	377,850	418,162	438,789	445,408	428,068	672,901				3,195,841
Variance to calculated generation kWh	-2,765	-1,709	-1,094	-3,741	-57,814	-7,235	-10,637	-21,517	-5,590	-	-	-	-112,102
Variance to calculated generation %	-1.1%	-2.9%	-1.0%	-1.0%	-13.8%	-1.6%	-2.4%	-5.0%	-0.8%				-3.5%
Approximate revenue	£18,747	£7,087	£14,675	£52,099	£50,104	£60,181	£148,850	£137,974	£227,701				£724,495
Capacity factor (monthly)	20.6%	4.8%	9.5%	31.0%	29.9%	37.0%	36.1%	34.9%	55.4%				28.8%
Industry wide RoR capacity factor	20.7%	5.7%	6.0%	27.5%	25.0%	36.0%	40.0%	45.0%					25.7%
FY 2022/3	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	YTD
Actual generation kWh	247,605	424,386	286,501	329,058	257,505	238,578	692,787	709,873	223,709	633,347	447,449	356,352	4,847,150
Average generation since commissioning	247,605	424,386	286,501	165,261	174,610	297,736	672,489	693,043	368,179	594,556	547,677	298,520	4,770,561
Forecast generation (P50)	369,360	226,766	188,561	195,146	280,601	387,431	582,631	618,214	620,057	695,941	554,678	611,047	5,330,433
Actual relative to forecast	67.0%	187.1%	151.9%	168.6%	91.8%	61.6%	118.9%	114.8%	36.1%	91.0%	80.7%	58.3%	90.9%
Rainfall relative to 1991-2020 average	77%	126%	104%	74%	65%	93%	134%	112%	89%	104%	56%	118%	96%
Calculated generation kWh	253,540	432,296	294,437	330,341	257,587	239,724	700,013	748,966	295,507	639,670	459,640	358,262	5,009,984
Variance to calculated generation kWh	-5,935	-7,910	-7,936	-1,283	-82	-1,146	-7,226	-39,093	-71,798	-6,323	-12,191	-1,910	-162,834
Variance to calculated generation %	-2.3%	-1.8%	-2.7%	-0.4%	-0.0%	-0.5%	-1.0%	-5.2%	-24.3%	-1.0%	-2.7%	-0.5%	-3.3%
Approximate revenue ¹	£28,994	£50,244	£33,677	£38,789	£30,177	£27,894	£108,061	£111,476	£34,832	£44,660	£31,298	£52,804	£669,447
Capacity factor (monthly)	20.5%	39.0%	23.8%	28.2%	21.4%	20.5%	57.5%	60.9%	18.6%	52.5%	41.1%	29.6%	34.2%
Industry wide RoR capacity factor	19.4%	34.6%	18.3%	15.5%	15.5%	11.9%	55.8%	59.0%	32.6%	58.8%	50.2%	30.9%	33.5%

¹Export element of revenue updated to reflect actual export and rate.

